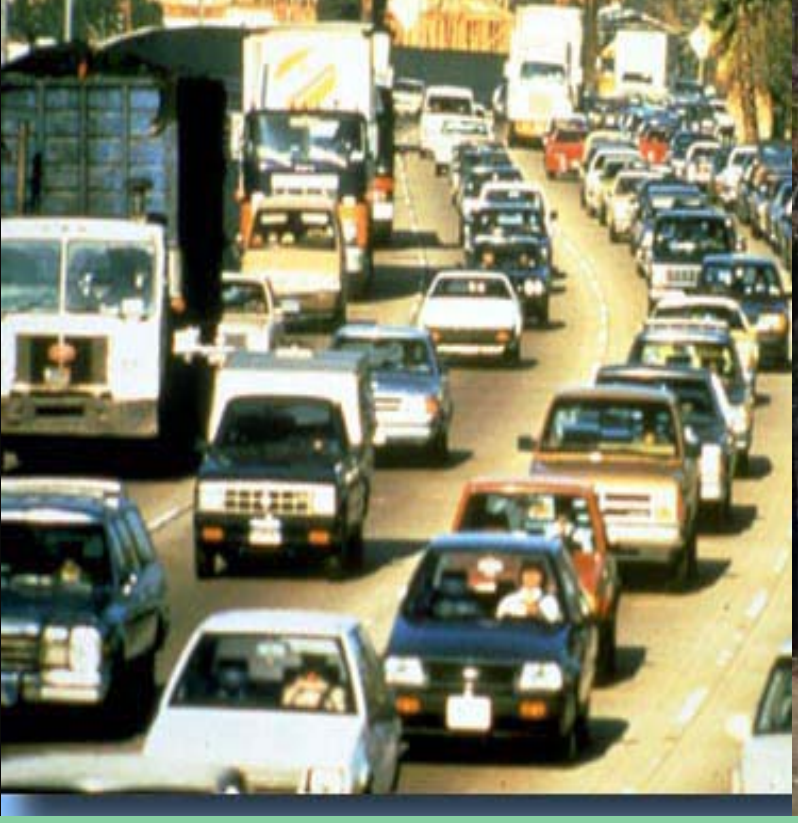

Fiscal Year 2002
Massachusetts Greenhouse Gas Inventory

For State Agencies

February 2004

MASSACHUSETTS
STATE
SUSTAINABILITY
PROGRAM

PUBLIC LEADERSHIP,
STEWARDSHIP, COMMITMENT

Acknowledgements

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About the Massachusetts State Sustainability Program

In recognition of state government's environmental impact and its potential to address a number of environmental concerns, the State Sustainability Program was established in July 2002 by Executive Order No. 438 (E.O. No. 438). The Order calls on all state agencies to "work diligently and expeditiously to develop and implement policies and procedures to promote environmentally sustainable practices," and established a governing Coordinating Council, made up of key agencies and offices.

State Sustainability Program Committees

1. **Climate Change/Energy Efficiency**
2. **Waste Reduction**
3. **Mercury Reduction**
4. **Sustainable Design**
5. **Water Conservation**
6. **Environmentally Preferable Purchasing**
7. **Compliance**
8. **Natural Resource Protection**

The Massachusetts State Sustainability Program focuses on state agency operations and activities in order to:

- Address the environmental and health impacts associated with agency activities
- Incorporate long-range environmental planning into day-to-day operations
- Make government more efficient and reduce operating costs
- Incorporate the true environmental and health costs related to the construction, purchase, operation, maintenance, and disposal of buildings, goods, materials, etc. into agency decisions
- Establish state government as a model for other sectors
- Help ensure that future generations of Massachusetts citizens enjoy a quality of life at least as high as today's

A State Sustainability Coordinating Council (the Council), made up of 15 agencies and offices, directs the program and coordinates efforts with all agencies. Five additional entities have joined the Council since its inception (please see Appendix 1 for a full Council list). The Council meets monthly to set priorities and provide direction for sustainable activities at state agencies, and reviews recommendations from one or more of the eight committees that focus on various topics. Each member of the Council appoints one or more designees to participate in Council deliberations. For more information on the State Sustainability Program, go to: http://www.mass.gov/envir/sustainable/.

Executive Summary

The Commonwealth of Massachusetts recognizes the importance of reducing statewide greenhouse gas (GHG) emissions to counter the effects of climate change. As a signatory to the 2001 New England Governors and Eastern Canadian Premiers Climate Change Action Plan, the Commonwealth has committed to reducing regional GHG emissions to 1990 levels by 2010, and 10% below 1990 levels by 2020. The NEG-ECP Climate Change Action Plan calls on state and provincial governments to reduce government GHG emissions by 25% by 2012, a goal that is was adopted by Executive Order No. 438, which established the State Sustainability Program (Program) in July, 2002.

To meet these goals, the Massachusetts State Government Greenhouse Gas Inventory (Inventory) has been developed by the Program to establish a fiscal year 2002 greenhouse gas emissions baseline for all state agencies and authorities. Creating an inventory of state government's GHG emissions will help to track progress and promote energy efficiency and use of alternative fuels throughout state buildings and vehicles.

The inventory includes carbon dioxide (CO_2) emissions from all executive agencies and those authorities where emissions were considered significant and where data was available. Emissions are calculated from data on the consumption of electricity, natural gas, coal, #2, #4 and #6 fuel oils, compressed natural gas, ethanol, propane, gasohol, diesel and gasoline in Fiscal Year 2002 (July 1, 2001 to June 30, 2002).

Data on fuel consumption was gathered and analyzed to determine the total government CO_2 emissions, individual agency emissions, emissions coming from each fuel type, and emissions categorized by its end function (buildings vs. transportation). Key findings include:

- State operations emitted 1.36 million metric tons (MMT) of carbon dioxide in fiscal year 2002, or 1.4% of the 94.8 million metric tons of total statewide GHG emissions in 2000.
- 69% of the emissions came from building fuel consumption, with 31% of the emissions from the transportation sector (including mass transit).
- Electricity constitutes 48% of all state government emissions - one-third of electricity consumption was for mass transit in the MBTA system.
- Fuel oils (#2, #4 and #6) and diesel fuel account for the second and third highest source of emissions, at 17% and 16% respectively.
- The fifteen largest agency emitters of CO_2 account for over 80% of total emissions.
- The total emissions from state facilities is equivalent to the amount of CO_2 that could be sequestered by 408,437 forested acres of land, and equal to the emissions from 226,552 average passenger cars over one year.
- 42% of the total GHG emissions are from the independent authorities (MBTA, MassPort, MWRA, Turnpike) included in the inventory

Introduction

Massachusetts clearly recognizes the need to reduce its GHG emissions in order to lessen the real and potential effects of global warming, caused in large part by the burning of fossil fuels to heat and cool buildings, power machinery and equipment, and fuel personal and commercial vehicles and mass transit. The Commonwealth has demonstrated its commitment to reducing its GHG emissions by supporting development of and signing the 2001 New England Governors and Eastern Canadian Premiers Climate Change Action Plan. This plan commits the region to reducing overall GHG emissions to 1990 levels by 2010, and 10% below 1990 levels by 2020. The Plan also calls on state governments to reduce their own GHG emissions by 25% by the year 2012.

This Fiscal Year 2002 Greenhouse Gas Inventory has been prepared by the Massachusetts State Sustainability Program, and is the first time carbon dioxide emissions from Massachusetts government facilities have been collected and compiled in a comprehensive way. The Inventory has been reviewed and approved by the State Sustainability Coordinating Council, which is made up of fifteen agencies and offices directed to govern the Program.

To help state government meet the goals contained in the regional Climate Change Action Plan and the State Sustainability Executive Order, this inventory will establish a carbon dioxide emissions baseline for all state agencies and authorities. This baseline will enable the Commonwealth to track progress toward meeting these goals and identifying ways to reduce GHG emissions through energy efficiency and use of alternative fuels throughout state buildings and vehicles.

Scope of Massachusetts State Government

Massachusetts state government is made up of a multitude of services and programs, all of which consume significant amounts of energy for their operations and activities. Over 150 agencies, universities, courts, and other entities employ more than 78,000 employees (not including authorities) who work in more than 5,000 buildings on more than 556,000 acres. Over 85 million square feet of owned and 7 million sq ft of leased buildings consume electricity, heating oil, natural gas and other fuels that provide light, power equipment, heat and provide hot water to building occupants.

Massachusetts state facilities vary greatly in size and function, ranging from office buildings, to medical facilities, and highway depots. More specifically, state owned properties include 8 hospitals, hundreds of specialized health facilities, 19 correctional facilities, 29 college and university campuses, hundreds of state parks and recreational facilities, and many large and small office buildings. In many cases, buildings are open 24 hours per day, 365 days per year, necessary for prisons, hospitals, colleges and universities, and homes for the disabled. These facilities use significant amounts of energy to heat and cool buildings, power machinery, and light workspaces.

Significant amounts of fuel are also used by state agencies for transportation purposes. From the electricity used for subways, to diesel fuel for trucks and commuter rail lines, fuel is consumed to ensure

the successful day-to-day operation of state functions. In FY 02, some 8,000 vehicles traveled 47.3 million miles over the more than 12,000 highway lane-miles owned and operated by the state, and approximately 1.8 million riders were served by the MBTA public transportation system each day.

The procurement of all types of energy is costly to state government, and reducing energy use by even a small percentage will have a significant impact on energy expenditures. Although specific cost data for FY02 energy consumption was difficult to obtain from some authorities and non-executive offices, records from agencies emitting some two-thirds of state government's CO_2 emissions reveal that energy expenditures totaled at least $144 million.

Inventory Scope and Limitations

This inventory estimates carbon dioxide emissions from state government operations during Fiscal Year 2002 (July 1, 2001 to June 30, 2002) from 86 state agency offices, 29 state colleges and universities, the Massachusetts Port Authority (MassPort), the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Turnpike Authority (Turnpike), and the Massachusetts Water Resources Authority (MWRA). Complete data has not been included in the inventory for certain quasi-state agencies and offices where data was not available, including the regional transportation agencies, sheriffs' offices, and some district attorney offices, and several authorities. The State Sustainability Program will to attempt to gather this data in future years (see Appendix B for the complete list of agency emission data included in the inventory).

GHG emissions included in this Inventory have been calculated from energy use and consumption data including the following energy sources:

- Electricity
- Natural gas
- Coal
- Heating oils (#2, #4 & #6)
- Gasoline
- Diesel fuel
- Compressed natural gas
- Propane
- Ethanol
- Gasohol

Considering that CO_2 emissions account for 84% of the nationwide emissions in the United States, and due to limited resources at the State Sustainability Program, this inventory calculates emissions based solely on CO_2 emissions from energy consumption, but not from other greenhouse gases such as methane or nitrous oxide. In addition, CO_2 emissions from other state operations, such as employee commuting or use of their own cars in business travel, waste generation, and procurement of construction and other materials, are not included in this assessment, despite their potential contribution to climate change. While such data would make this inventory even more complete, data for such items is extremely difficult to obtain. The Program will attempt to expand this inventory in the future should additional data become available.

Additionally, while the Program has attempted to obtain energy consumption data from all state agencies, in some cases such data does not readily exist. This is particularly true for leased facilities, where energy costs are often part of the lease arrangement and such information is not accessible to state agencies. While leased space for Commonwealth agencies makes up less than 10% of the total building space, the Program is working to include this data in future years.

Data Collection and Calculations

Energy consumption data for the different fuel types was collected from several different sources, depending on availability of records for each fuel type. The majority of the data was collected centrally from purchasing records and vendor reports from vendors on state contracts, primarily with the cooperation of the Operational Services Division, the Commonwealth's central purchasing agency. Where data was not available centrally, it was compiled and reported to the State Sustainability Program for individual facilities and agencies through the agency Sustainability Coordinators.

Electricity and natural gas data were more difficult to obtain, as statewide contracts for these energy types are not currently in place. In cases where electricity and natural gas consumption data was not available, but accurate cost data *was* available from the state accounting system, these procurement records were used to estimate consumption for those agencies. An average cost of $1.10 per therm, based on the U.S. Department of Energy's 2001 and 2002 Energy Information A average cost in Massachusetts, was used for natural gas, and an average cost of $.10 per kWh was used to estimate electricity consumption, as recommended by the Massachusetts Division of Energy Resources. The Program is working to obtain more accurate agency-by-agency natural gas and electricity consumption data in the future (please see Appendix C for details on energy consumption data sources and Massachusetts state contracts).

Standard conversion factors from the U.S. Environmental Protection Agency were used to calculate CO_2 emissions from all energy sources other than electricity and are included in the chart below.

Fuel	Unit	Conversion Factor (lbs. Of CO_2 / unit)
Electricity	kWh	0.93
Natural Gas	therm	12.06
Bituminous Coal	tons	4,931.00
Oil #4	gal	22.38
Oil #6	gal	26.03
Oil #2	gal	22.38
CNG	gal	1.21
Ethanol	cu ft	12.54
Propane	Gal	12.70
Gasahol	gal	19.36
Diesel	gal	22.38
Gasoline	gal	19.56

The electricity factor used is based on a New England regional average calculated by the New England Power Pool (NEPOOL), as much of the electricity purchased and used in Massachusetts comes from various sources throughout the region. The conversion factor reflects the average blend of fuel sources that are used to generate electricity, including coal, natural gas, nuclear, and other sources. (See Appendix B for more information on sources of all conversion factors)

Overview of State Government Greenhouse Gas Emissions

Over 1.35 million tons of CO_2 were emitted in FY02 as a result of Massachusetts state government activities. Of this total, just over two-thirds (68.8%) of the emissions were from building energy use -- a combination of electricity, natural gas, coal and fuel oils. The remaining emissions (31.2%) were from fuels used primarily for transportation, including gasoline, diesel fuel, compressed natural gas (CNG), ethanol, propane, gasohol, and electricity for the MBTA subway system. This breakdown between building and vehicle is a rough estimate given that diesel fuel, though primarily used for vehicles, can also be used as a backup fuel for building energy needs.

The 1.35 million tons emitted by state agencies equals 1.4% of the 94.8 million metric tons of CO_2 emitted by all activities that occur throughout the Commonwealth, including in the individual, business, and institutional sectors, as reported by the Massachusetts Statewide 2002 Climate Change Inventory. While only a small percentage of the total, state government can play a key role in leading by example and demonstrating that significant GHG reductions can take place within a large institution such as state government.

The following sections of this Inventory analyze and report on the GHG emissions from state government in a variety of different ways, useful for individual agencies and for the State Sustainability Program. Inventory data has been broken down into:

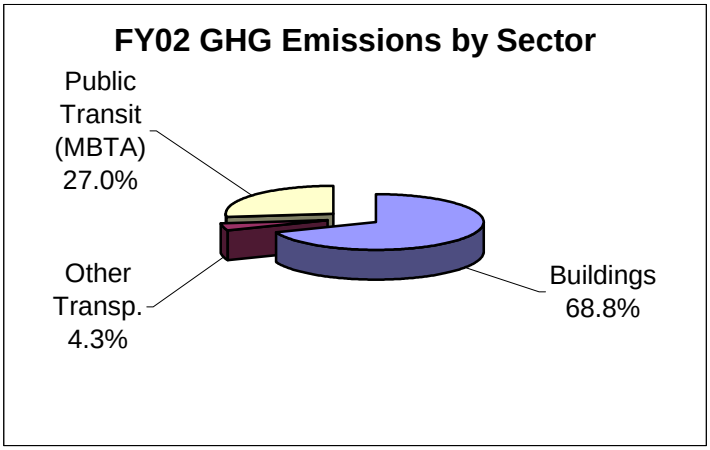
- GHG Emissions by Sector (Transportation vs. Buildings)
- GHG Emissions by Fuel Type
- GHG Emissions by Agency
- GHG Emissions by Governmental Function
- Environmental Impact of State GHG Emissions

Greenhouse Gas Emissions by Sector

Although impossible to identify the exact purpose of every bit of fuel consumption, some overall assumptions can be made about the use of each fuel type. For purposes of this inventory, emissions have been broken out by major sector: buildings and transportation, and several assumptions have been made about the use of each fuel type, including:

- Electricity for building use is used primarily to light and cool buildings and to power various types of building systems and equipment;
- Fuel oils and natural gas are used mainly to provide building heat;
- Diesel fuel is used primarily to fuel heavy vehicles, such as buses, commuter trains and trucks (although it is also used for building furnaces and for back-up generators to provide emergency power, this inventory assume that the vast majority used for transportation purposes).

It should be noted that while most electricity usage is associated with building operations, in the case of state government, more than one-third of electricity consumption is used to run the MBTA mass transit systems.



In Fiscal Year 2002, CO_2 emissions from fuels consumed for building systems totaled 69% while emissions from fuels for transportation totaled 31%, 27% from MBTA services and 4% from other transportation fuel use. This contrasts with a national average of 27% of CO_2 emissions coming from the transportation sector, according to the 2003 US Greenhouse Gas Inventory report.

CO_2 Emissions per Fuel Type for Building and Transportation Sectors

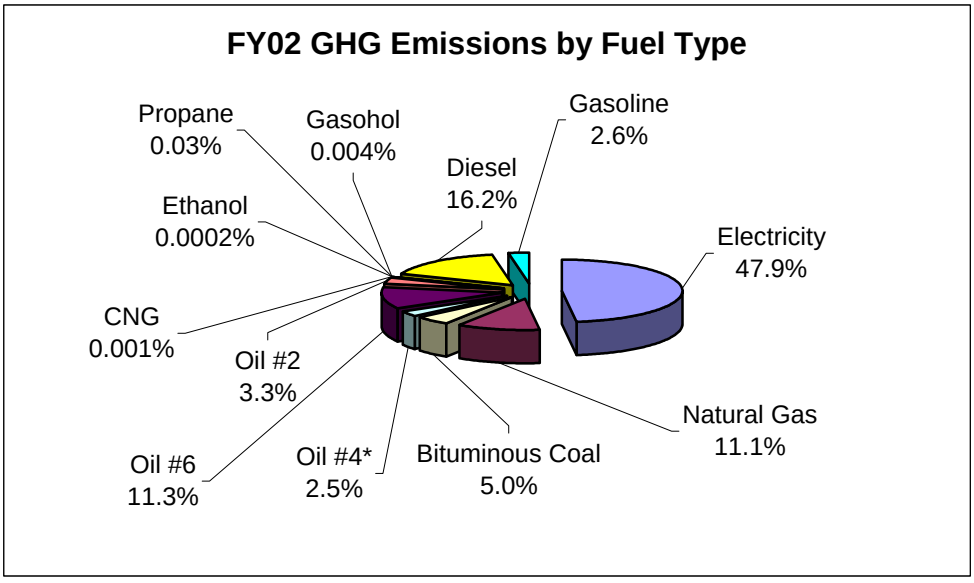
	Building Energy Use						Transportation Fuel Use							Totals
Agency	**Electricity (kWh)**	**Natural Gas (therms)****	**Bituminous Coal (tons)**	**Heavy Oil (#4) (Gallons)**	**Heavy Oil (#6) (Gallons)**	**#2 Oil (Gallons)**	**At the Pump CNG (gallons)**	**MBTA electricity (kWh)**	**At the Pump Ethanol (gal)**	**Propane (gallons)**	**At the Pump Gasahol (Gallons)**	**Diesel (Gallons)**	**Gasoline (Gallons)**	**Total tons CO_2**
Conversion Factor	*0.93*	*12.06*	*4,931.00*	*22.40*	*26.03*	*22.38*	*1.21*	*0.93*	*12.54*	*12.70*	*19.36*	*22.38*	*19.56*	
Consumption	**1,146,212,319**	**27,585,452**	**30,257**	**3,351,930**	**12,955,955**	**4,436,620**	**20,861**	**397,632,338**	**526**	**60,257**	**5,900**	**21,698,997**	**4,055,967**	
Units	kWh	therms	tons	gallons	gallons	gallons	gallons	kWh	gal	gallons	gallons	gallons	gallons	
CO_2 tons	483,436	150,876	67,663	34,051	152,945	45,030	11	167,709	3	347	52	220,237	35,979	**1,358,341**
% of total CO_2 by fuel	35.59%	11.11%	4.98%	2.51%	11.26%	3.32%	0.001%	12.35%	0.000%	0.03%	0.004%	16.21%	2.65%	100.0%
Total tons of CO2 by sector	**934,002**						**424,339**							**1,358,341**
% of Total CO2 by sector	**68.8%**						**31.2%**							**100%**
% of sector CO2 by fuel	51.76%	16.15%	7.24%	3.65%	16.38%	4.82%	0.00%	39.52%	0.00%	0.08%	0.01%	51.90%	8.48%	
												Total MA Emissions		**94,800,000**
												Govt % of Total		**1.43%**

Greenhouse Gas Emissions by Fuel Type

The chart below details GHG emissions from each of the 13 different fuel types included in this inventory. It is important to note that four of these energy sources -- electricity, fuel oils, diesel fuel, and natural gas, make up more than 92% of overall CO_2 emissions: More specifically:

- electricity use accounted for **47.9%** of total emissions
- fuel oils #2, #4, and #6 made up **17.1%** of emissions
- diesel fuel contributed **16.2%** of total emissions.
- Natural gas accounted for **11.1%** of emissions

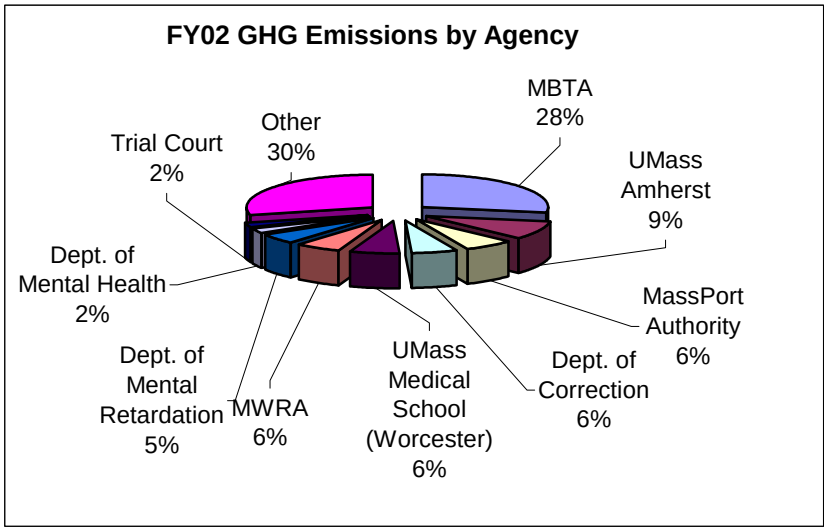
Fuel Type	Unit	Amount	Conversion Factor	CO2 Emissions (tons)	% of Total
Electricity	kWh	1,543,844,657	0.93	651,145	47.9%
Natural Gas**	therm	27,585,452	12.06	150,876	11.1%
Bituminous Coal	tons	30,257	4,931.00	67,663	5.0%
Oil #4*	gal	3,351,930	22.40	34,021	2.5%
Oil #6	gal	12,955,955	26.03	152,945	11.3%
Oil #2	gal	4,436,620	22.38	45,030	3.3%
CNG	gal	20,861	1.21	11	0.001%
Ethanol	cu ft	526	12.54	3	0.000%
Propane	gal	60,257	12.70	343	0.025%
Gasahol	gal	5,900	19.36	52	0.004%
Diesel	gal	21,698,997	22.38	220,237	16.2%
Gasoline	gal	4,055,967	19.56	35,979	2.6%
Total				**1,358,306**	
			lbs	tons	



Greenhouse Gas Emissions by Agency

Identifying the largest emitters of CO_2 can help to target those agencies where energy reductions would have the largest environmental and fiscal impact. However, significant CO_2 emissions should not be equated with inefficient operations, given the magnitude of operations of many of these agencies. The Program will be working with these and other agencies to develop procedures to benchmark building and facility performance, as well as examine fleet configurations and fuel use, to identify the best opportunities for energy reductions.

Together, the top ten agency contributors account for 72% of state agency emissions, with the top twenty accounting for over 86%. The ten largest GHG emitters include four authorities (MBTA, MWRA, MASSPORT, Turnpike), two universities (Amherst, Worcester), the trial court system, and three executive agencies (Correction, Mental Retardation, Mental Health). All of these agencies have significant numbers of buildings and/or vehicles, and have extensive operations that often run 24 hours a day.



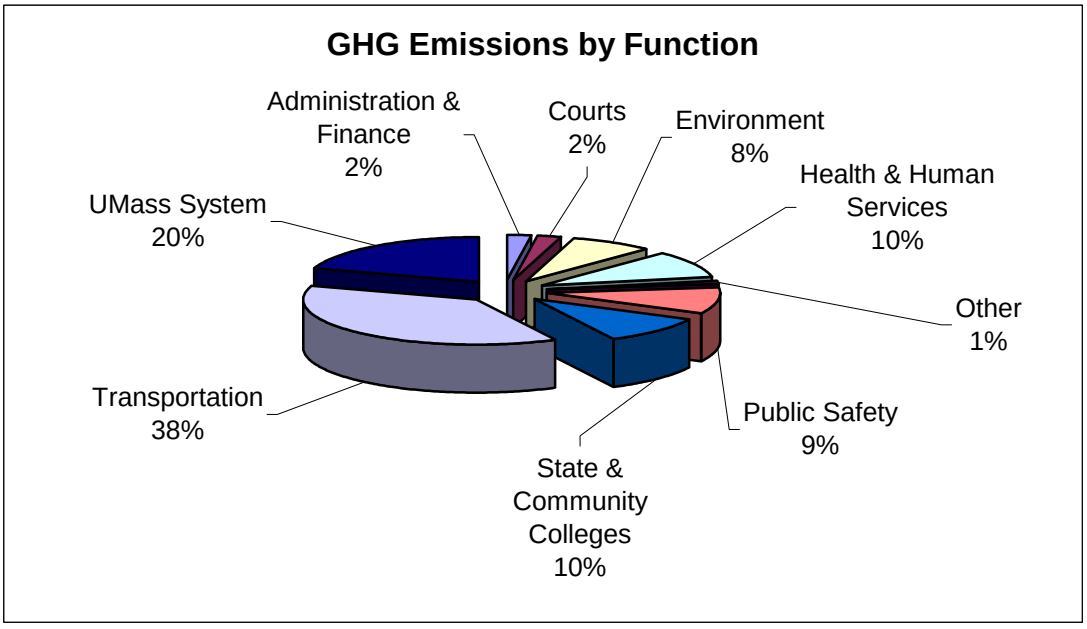
Top 20 Agency GHG Emissions

Agency	Total Tons CO2 Emissions	Car Equivalent	Tree Equivalent per year	% of Agency Total	% Combined
MBTA	374,392	62,445	82,553,523	27.6%	**27.6%**
UMass Amherst	123,028	20,520	27,127,628	9.1%	**36.6%**
UMass Medical School (Worcester)	86,032	14,349	18,970,076	6.3%	**43.0%**
Mass Port Authority	84,104	14,028	18,544,986	6.2%	**49.1%**
MWRA	78,921	13,163	17,401,977	5.8%	**55.0%**
Dept. of Correction	78,836	13,149	17,383,384	5.8%	**60.8%**
Dept. of Mental Retardation	68,647	11,450	15,136,558	5.1%	**65.8%**
Dept. of Mental Health	33,518	5,590	7,390,624	2.5%	**68.3%**
Trial Court	28,456	4,746	6,274,646	2.1%	**70.4%**
Mass. Turnpike Authority	27,995	4,669	6,172,928	2.1%	**72.4%**
UMass Boston	25,888	4,318	5,708,368	1.9%	**74.3%**
UMass Dartmouth	25,461	4,247	5,614,066	1.9%	**76.2%**
Mass. Highway Dept.	23,320	3,889	5,141,954	1.7%	**77.9%**
Metropolitan District Commission	21,454	3,578	4,730,668	1.6%	**79.5%**
Bridgewater State College	19,527	3,257	4,305,777	1.4%	**81.0%**
Military Division	18,797	3,135	4,144,705	1.4%	**82.3%**
Dept. of Public Health	16,720	2,789	3,686,691	1.2%	**83.6%**
Bureau of State Office Buildings	16,427	2,740	3,622,197	1.2%	**84.8%**
Division Cap Asset Management	13,567	2,263	2,991,558	1.0%	**85.8%**
UMass Lowell	12,529	2,090	2,762,722	0.9%	**86.7%**

Greenhouse Gas Emissions By Function

The inventory data is also broken out into seven functional categories to help identify where CO_2 emissions were the most significant within the structure of Massachusetts state government. Within these categories, six areas account for 94% of total CO_2 emissions (see pie chart below). Statistics of note include:

- The UMass system and state and community colleges combined account for 30% of total emissions.
- Transportation agencies are responsible for 38% of emissions
- Public safety, health and human services, and environmental agencies make up 27% of the total (9%, 10%, and 8% respectively).



Environmental Impacts

GHG emission numbers such as those highlighted in this inventory can be difficult to understand in terms of their impact on the overall issue of climate change. Putting information in the context of its environmental impact can be helpful. CO_2 emissions are often expressed environmentally through an analysis of emissions that equates to the number of cars traveling for one year and the number of trees it would take to sequester the CO_2 amounts being discussed.

Based on an EPA average CO_2 sequestration per forested acre conversion, the 1.35 million tons of CO_2 released by state facilities in Fiscal Year 2002 is roughly equal to the amount of carbon that could be sequestered by 408,437 acres of forested land per year, approximately 2/3 the size of Rhode Island. 1.5 million tons of CO_2 emissions are also equivalent to the emissions of 226,552 average passenger cars over one year.

CO_2 emissions equal to the amount of carbon dioxide sequestered by 408,437 acres

CO_2 emissions equivalent to the emissions of 226,552 average cars on the road for a year

Summary

This FY02 State Agency Greenhouse Gas Inventory is an important piece of the Massachusetts plan for meeting the New England Governors and Eastern Canadian Premiers goal, also adopted by the State Sustainability Program, of a 25% reduction in state government CO_2 emissions by 2012. While we recognize that this inventory is not inclusive of all emissions from state operations, it does succeed in highlighting the major sources of emissions, both by agency and fuel type, and provides a useful baseline for prioritizing reductions and documenting success as we move forward.

Many agencies have already begun taking steps towards reducing their GHG emissions by retrofitting facilities, purchasing more efficient vehicles, using less polluting fuels, and purchasing efficient equipment for their facilities. In addition, the Division of Capital Asset Management (DCAM), responsible for all major construction and building projects at public facilities, runs a Performance Contracting program which has resulted in significant savings over the past years. More information on specific emission reduction activities of state agencies will be reported in the Annual Sustainability Report to the Governor later this spring, as well as available on the State Sustainability Program website at http://www.mass.gov/envir/sustainable.

Conversion Factors:

Fuel Conversion Factors

Conversion factors for natural gas, motor gasoline, diesel gasoline, distillate fuel #2, #4, residual fuel #6, propane, and coal are from the Energy Information Administration (EIA), U.S. Department of Energy <www.eia.doe.gov/oiaf/1605/factors.html>

Fuel	Unit	Conversion Factor (lbs. Of CO_2 / unit)
Electricity	kWh	0.93
Natural Gas	therm	12.06
Bituminous Coal	tons	4,931.00
Oil #4	gal	22.38
Oil #6	gal	26.03
Oil #2	gal	22.38
CNG	gal	1.21
Ethanol	cu ft	12.54
Propane	gal	12.70
Gasahol	gal	19.36
Diesel	gal	22.38
Gasoline	gal	19.56

Electricity Conversion Factor

The electricity factor of .93 lbs of CO_2 per kWh electricity is based on an average of the New England Power Pool's (NEPOOL) emission factors for the New England region for 2001 and 2002.

Calculations

Car equivalents:

The number of average cars that would create an equal volume of carbon dioxide, are calculated using the following equation:

= (Lbs. CO_2) x (.0511 gallons gasoline/lbs. CO_2) x (20.4 mpg) **/** (12,500 miles/car-year)

Average fuel economy:

20.4 miles per gallon as an average vehicle fuel economy is from EPA's 2001 report "Light-Duty Automotive Fuel Economy Trends, 1975 –2001" (www.epa.gov/otaq/cert/mpg/fetrends/r01008.pdf).

The average "annual miles driven" per vehicle (12,500) is from the U.S. Department of Transportation's National Personal Transportation Survey (www.cta.ornl.gov/npts/1990/fat/tab3_26.pdf).

Carbon Dioxide Sequestration calculations:

EPA default assumptions (from Memorandum from Daniel Klein at ICF to EPA dated October 3, 1995)

CO_2 Sequestration per tree per year = 10 lbs CO_2 / tree / year

Annual CO_2 Sequestration per forested acre = 7,333 lbs CO_2 / acre

Appendix B: Agencies included in the FY02 GHG Inventory

Agency	Total Tons CO2 Emissions	Car Equivalent	Tree Equivalent per year	% of Agency Total	% Combined
MBTA	374,392	62,445	82,553,523	27.6%	**27.6%**
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UMass Medical School (Worcester)	86,032	14,349	18,970,076	6.3%	**43.0%**
Mass Port Authority	84,104	14,028	18,544,986	6.2%	**49.1%**
MWRA	78,921	13,163	17,401,977	5.8%	**55.0%**
Dept. of Correction	78,836	13,149	17,383,384	5.8%	**60.8%**
Dept. of Mental Retardation	68,647	11,450	15,136,558	5.1%	**65.8%**
Dept. of Mental Health	33,518	5,590	7,390,624	2.5%	**68.3%**
Trial Court	28,456	4,746	6,274,646	2.1%	**70.4%**
Mass. Turnpike Authority	27,995	4,669	6,172,928	2.1%	**72.4%**
UMass Boston	25,888	4,318	5,708,368	1.9%	**74.3%**
UMass Dartmouth	25,461	4,247	5,614,066	1.9%	**76.2%**
Mass. Highway Dept.	23,320	3,889	5,141,954	1.7%	**77.9%**
Metropolitan District Commission	21,454	3,578	4,730,668	1.6%	**79.5%**
Bridgewater State College	19,527	3,257	4,305,777	1.4%	**81.0%**
Military Division	18,797	3,135	4,144,705	1.4%	**82.3%**
Dept. of Public Health	16,720	2,789	3,686,691	1.2%	**83.6%**
Bureau of State Office Buildings	16,427	2,740	3,622,197	1.2%	**84.8%**
Division Cap Asset Management	13,567	2,263	2,991,558	1.0%	**85.8%**
UMass Lowell	12,529	2,090	2,762,722	0.9%	**86.7%**
Westfield State College	12,497	2,084	2,755,645	0.9%	**87.6%**
Fitchburg State College	11,171	1,863	2,463,270	0.8%	**88.4%**
Salem State College	10,721	1,788	2,363,934	0.8%	**89.2%**
Mass. Maritime Academy	8,679	1,447	1,913,619	0.6%	**89.9%**
County Expenses	8,596	1,434	1,895,415	0.6%	**90.5%**
Framingham State College	8,591	1,433	1,894,256	0.6%	**91.1%**
Worcester State College	8,357	1,394	1,842,688	0.6%	**91.7%**
Springfield Technical Comm. College	7,069	1,179	1,558,714	0.5%	**92.3%**
Sheriff's Dept. Worcester	5,887	982	1,298,141	0.4%	**92.7%**
Mass. College of Liberal Arts	5,368	895	1,183,565	0.4%	**93.1%**
Mass. College of Arts	5,139	857	1,133,182	0.4%	**93.5%**
Dept. of State Police	4,945	825	1,090,365	0.4%	**93.8%**
Sheriff's Dept. Plymouth	4,859	811	1,071,516	0.4%	**94.2%**
Chelsea Soldier's Home	4,155	693	916,211	0.3%	**94.5%**
Massasoit Comm. College	4,014	669	885,086	0.3%	**94.8%**
Bunker Hill Comm. College	4,013	669	884,935	0.3%	**95.1%**
Bristol Comm. College	3,961	661	873,322	0.3%	**95.4%**
Northern Essex Comm. College	3,892	649	858,212	0.3%	**95.7%**
Dept. of Environmental Management	3,725	621	821,335	0.3%	**95.9%**
Mount Wachusett Comm. College	3,517	587	775,524	0.3%	**96.2%**
Dept. of Youth Services	3,441	574	758,670	0.3%	**96.5%**
Sheriff's Dept. Hampden	3,112	519	686,259	0.2%	**96.7%**
Sheriff's Dept. Essex	2,994	499	660,279	0.2%	**96.9%**
Middlesex Comm. College	2,937	490	647,542	0.2%	**97.1%**
Holyoke Comm. College	2,624	438	578,684	0.2%	**97.3%**
Sheriff's Dept. Middlesex	2,396	400	528,378	0.2%	**97.5%**
North Shore Comm. College	2,336	390	515,023	0.2%	**97.7%**
Berkshire Comm. College	2,167	361	477,905	0.2%	**97.8%**
Quinsigamond Comm. College	2,140	357	471,898	0.2%	**98.0%**
Roxbury Comm. College	1,903	317	419,505	0.1%	**98.1%**
Greenfield Community College	1,884	314	415,333	0.1%	**98.3%**

Lottery Commission	1,640	274	361,660	0.1%	**98.4%**
Dept. of Employment and Training	1,599	267	352,508	0.1%	**98.5%**
Dept. of Transitional Assistance	1,587	265	349,978	0.1%	**98.6%**
Sheriff's Dept. Hampshire	1,438	240	317,134	0.1%	**98.7%**
Cape Cod Comm. College	1,329	222	293,000	0.1%	**98.8%**
Holyoke Soldier's Home	1,274	212	280,881	0.1%	**98.9%**
Dept. of Revenue	1,182	197	260,705	0.1%	**99.0%**
Sheriff's Dept. Berkshire	1,174	196	258,810	0.1%	**99.1%**
Mass. Bay Comm. College	1,083	181	238,735	0.1%	**99.2%**
Office of the State Comptroller	965	161	212,815	0.1%	**99.2%**
Dept. of Environmental Protection	844	141	186,026	0.1%	**99.3%**
Secretary of the Commonwealth	806	134	177,619	0.1%	**99.4%**
Dept. of Fire Services	798	133	176,056	0.1%	**99.4%**
Chief Medical Examiner	670	112	147,692	0.0%	**99.5%**
Dept. of Fisheries & Wildlife	666	111	146,906	0.0%	**99.5%**
Emergency Management Agency	603	101	132,947	0.0%	**99.6%**
Parole Board	548	91	120,800	0.0%	**99.6%**
Dept. of Social Services	513	86	113,210	0.0%	**99.6%**
Sheriff's Dept. Franklin	424	71	93,557	0.0%	**99.7%**

Appendix C: Sources of Energy Use Data

STATEWIDE CONTRACT VENDOR REPORTS

Fuel Oil #2:
Data collected from vendor reports from statewide contract #EN008 for Distillate Fuel Oil

Fuel Oil #4, #6
Data collected from vendor reports from statewide contract #EN009 for Residual fuels

Gasoline and Diesel Fuel Data
Data collected from vendor reports from the statewide fuel card contract #STOG05A
Data collected from vendor reports from the statewide bulk gasoline contract #EN005
Data collected from vendor reports from the statewide bulk diesel contract #ENE09

Propane, CNG, Ethanol, Gasahol Data
Data collected from vendor reports from the statewide fuel card contract #STOG05A

ACCOUNTING RECORDS

Electricity
When exact kWh usage data was not available, kWh of electricity was estimated based on cost data from the state procurement system for FY02. An average cost of $.10 per kWh was used.

Natural Gas
When exact consumption data for natural gas was not available, therms of natural gas purchased was estimated based on cost data from the state procurement system for FY02. An average cost of $1.10 per them was used.

AGENCY REPORTING

Some agencies and authorities were able to report on their exact consumption for some or all types of fuel data. Agency reported data is identified on the master Greenhouse Gas Inventory spreadsheet, available by request from the State Sustainability Program.